"Prevalence of Gastro-Intestinal Nematode in Small Ruminants on Haramaya University Farm"

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ABSTRACT

A cross-sectional study was conducted from November 2017 to April 2018 in Haramaya University farms Eastern Hararghe, Oromiya region to determine the prevalence of nematode parasites of small ruminants and to identify the possible risk factors associated with the major genera of nematode larvae. During the study period faceal samples were randomly collected from a total of 383 of small ruminants (216 ovine and 167 caprine). Standard parasitological methods including floatation and ova culture were employed in the study. Out of these, 340 (88.8%) animals were found positive for nematode parasites of which, 89.2% in ovine and 88.4% in caprine were recorded. Out of 229 positive samples the species of parasites were found Strongyle (22.9%), Fasciola (14.1%), Paramphistomum (7.03%), Monesia (5.73%) and as mixed infection (9.9%). Strongyles were the most prevalent parasites encountered in the area followed by Fasciola. In this study, maximum EPG counts were recorded in ovine species and females were severely infected than their counter part. In the present study, there was no association between different potential risk factors tested. However, high prevalence of nematode parasites was observed in the study area affecting wellbeing and productivity of the animals. In Conclusion the animal was affected by different helminthes parasites infections which cause loss of production, reducing growth rate and death of small ruminants. The farm should be used appropriate management system and deworming strategs their small ruminants by different anthelmintics based on order of the instruction of the Veterinarian to avoid drug resistance as recommendation.

1. INTRODUCTION

The livestock sector is a massive transformational state to meet increased demand of animal origin foods for increasing human population (Karim et al., 2008). Ethiopia is believed to have the largest livestock population in Africa. This livestock sector has been contributing considerable portion to the economy of the country, and still promising to rally round the economic development of the country. It is eminent that livestock products and by products in the form of meat, milk, honey, eggs, cheese, and butter supply etc provide the needed animal proteins that contribute to the improvement of the nutritional status of the people. Livestock also plays an important role in providing export commodities, such as live animals, hides, and skins to earn foreign exchanges to the country.

Ethiopia has an estimated of 53.4 million Cattle, 25.5 million sheep, 22.78 million goats, 2 million horses, 6.2 million donkeys, 0.38 million mules, about 1.1 million camels and 49.3 million poultries (CSA, 2011). Sheep and goat production play an important role in the livelihood security and economic sustenance of poor farmers in semiarid, arid, hilly and mountainous regions of the world. These animals survived under low input system Volume 3, Issue XII, December 2020 | 364

depending mostly on seasonal grasses, and crop straw (Karim et al., 2005). Sheep and goats are widely adapted to different climates and are found in all production system. They also have lower feed requirement as compared to cattle because of their small body size. This allows easy integration of small ruminants in to different farming system (Alemu and Markel, 2008).

Parasitic helminthes or worms are important cause of disease in all species of animal. Although in many case they produce little serious damage to the host, these parasites are never beneficial in some case they can produce sever and even fatal disease (Jones et al., 1996). Helminthes infections, or helminthosis, thus refer to a complex of conditions caused by parasites of the Nematoda, Cestoda and Trematoda. Although all grazing sheep and goats may be infected with the above mentioned parasites, low worm burdens usually have little impact on animal health. But as the worm numbers increase, effects in the form of reduced weight gain and decreased appetite occur.

With heavier worm burdens clinical signs such as weight loss, diarrhoea, anaemia, or sub-mandibular oedema (bottle jaw) may develop (Sissay, 2007).

The gastro intestinal tract may be inhibited by many species of parasites. Their cycle maybe direct which eggs and larvae are passed in the feces and stadial development occurs in to the infective stage, which then ingested by the final host. Alternatively the immature stage may be ingested by an intermediate host(usually invertebrate) in which further development occurs and an infection is acquired when the intermediates or free living stages shed by the host is ingested by final host. In host, resistance, age, nutrition and contaminant disease also influence the course of parasitic infection. The economic importance of subclinical parasitism in farm animal is also determined by the above factors, and it is well established that highly parasitized animal that show no clinical sing of the disease perform less efficiently in the feedlot, dairy or finishing (Kahn et al., 2005).

Gastrointestinal parasites infections are a world-wide problem for both small and large scale farmers, but their impact is greater in sub-Saharan Africa in general and Ethiopia in particular due to the availability of a wide range of agro-ecological factors suitable for diversified hosts and parasite species. Economic losses are caused by gastrointestinal parasites in a variety of ways: they cause losses through lowered fertility, reduced work capacity, involuntary culling, a reduction in food intake, lower weight gains, lower milk production, treatment costs, and mortality in heavily parasitized animals (Fikru et al., 2006).

In Ethiopia, 5-7 million sheep and goats die each year due to diseases including helminthes infections. More significant, however, are losses resulting from inferior weight gains, condemnation of organs and carcasses and lower milk yields. The overall economic loss to the Ethiopian meat industry due to parasitic diseases is estimated at US\$ 400 million annually (MOARD, 2007). Sheep and goats harbor a variety of gastrointestinal tract (GIT) parasites, many of which are shared by both species. Among these parasites, helminthes are the most important GIT parasites that affect the growth as well as production of the animals. Gastrointestinal nematodes of *Trichostrongylidae* family are perhaps the most important parasites of small ruminants worldwide, causing significant morbidity and loss of production.

Helminthic infections can be treated by anthelmintic, however, treatment is costly and drug resistance has evolved in all major parasite species (Ijaz et al., 2009). Parasitic infection ranges from acute disease frequently with high rates of mortality, chronic disease, resulting in various degrees of morbidity and premature culling to sub clinical infection with shoat appearing relatively healthy but frequently performing below their full potential.

The parasitic helminthes of small ruminant can be sub divided in to nematodes (round worm), trematode (flukes), and cestodes (tapeworms) (Aitken, 2007). It is impossible to give an accurate estimate of the economic importance of parasite diseases because it varies so greatly between countries and between region, depending both on climate and on the intensive farming in the area (Radostits et al., 1993). In the varied agroclimatic zones of Ethiopia, small ruminants are important source of income for rural communities and are one of the nation's major sources of foreign currency from exports. In Ethiopia about 8 millions of small ruminants are slaughtered annually and providing more than 30% of domestic meat consumption. The rich potential from the small ruminant sector is not efficiently exploited; however, due to several constraints, including malnutrition, inefficient management and diseases (Abebe and Esayas, 2001).

The HU has a sheep flock of approximately 400 head of the indigenous Black Head Ogaden (BHO) breed, which are managed separately from all other livestock owned by the University. Similarly, a goat flock of approximately 300 head of Anglo Nubian and local breeds (Short-eared Ogaden, Long-eared Ogaden and Hararghe Highland), as well as assorted cross-breed animals, is separately maintained. Therefore the objectives of this study in the study area were to determine the prevalence of gastrointestinal parasite of small ruminants in the study area and to assess the major risk factors associated with prevalence of GIT parasites of small ruminants.

2. Materials and Methods 2.1. Description of Study Area

The study was going to be conducted from November, 2017 to June, 2018 in Haramaya university shoat farm. Haramaya University is located in eastern Hararghe zone, Oromia regional state, Ethiopia. The district is located approximately at 15 km west of harar and 508 km east of capital city Addis Ababa. The elevation of the area is about 2000m above sea level and geographically located at 41°, 59'58'' and 09°, 10', 24'' latitude and longitude, respectively. The annual rainfall is estimated approximately an average of 900 mm.

There are about four season (from mid-March to mid-May) with short rainy season, short dry season (from end May to end of June), a long wet season (from July to mid-October) and along dry season (from end of October to February). More of Intensive and some of extensive farming system is practiced in the Haramaya university's shoat farm; where pasture production is expected after short rain season and continuing until the end of long wet season. Livestock population and farming system mainly mixed type agriculture in the area. Livestock population of the district estimated 193,334; of these populations 64,510 represent cattle, 28,359 goats, 18,930 sheep, 15,277 donkeys, 5 mules, 530 camels and 65,723 poultry (Haramaya District Agricultural Development Bureau, 2010).

2.2. Study Population

The HU has a sheep flock of approximately 400 head of the indigenous Black Head Ogaden (BHO) breed, which are managed separately from all other livestock owned by the University. Similarly, a goat flock of approximately 300 head of Anglo Nubian and local breeds (Short-eared Ogaden, Long-eared Ogaden and Hararghe Highland), as well as assorted cross-breed animals, is separately maintained. During the day, the sheep flock is herded on permanent communal grazing pasture together with animals (sheep, goats, cattle,) owned by local small-holder farmers. Animals are housed at night to prevent losses by theft and predators. In contrast, the university goat flock had grazed on a permanent natural pasture designated solely for the goat flock. Similarly, during the night all of the goats were housed. Each year there were two lambing and kidding periods, which were synchronised with the rain seasons, but mainly concentrated in August and September. This experimental flock comprised 4 groups of 15 animals, namely young male, young female, adult male and adult female sheep.

At the start of the experiment, the ages of the adult sheep were 1-1.5 years, and the young sheep were less than 6 months. A new experimental flock was established each year of the study period.

2.3. Sampling Technique

The sample size required for this study was determined based on sample determination in random sampling with expected prevalence of major gastro intestinal helminthes of small ruminant in the study area is 50% which no previous know prevalence and at 5% desire absolute precision and 95% confidence level according to Thursfield, (2005). Therefore, the sample size of 384 small ruminants (248 sheep and 136 goats) was obtained by using formula for sample size determination as given below as follow.

n = 1.962 Pexp (1-Pexp) d2

Where:

n = required sample size,

Pexp= expected prevalence = 50%

d= desired absolute precision = 5%

2.4. Study Design

The study design was cross-sectional which carried out to determine the prevalence of GIT helminthes parasites of small ruminants and to assess associated risk factor based on coprological examination.

Sample collection and coprological examination

The sample was collected from 384 small ruminants (248 sheep and 136 goats) directly from the rectum which is placed on sample container bottle with 10% formalin as preservative. During sample collection, date, sex, species of animal, age, and body condition of the animal were properly recoded. After collecting the sample was examined by flotation and sedimentation technique at haramaya university laboratories with a standard parasitological procedure described by (Hansen and Perry, 1994). Eggs of the different helminthes were identified on the basis of morphological appearance and size with the help of keys (Urquhart et al., 1996). Pellet faecal samples of the sheep and goat were tearing up using needle, and by the use of warm water to stimulate larvae to the bottom of the funnel for collection and identification.

During this period the larvae was hatched from the eggs and developed into L3. Finally larvae were recovered using the Baermann technique. From each culture, the third-stage larvae (L3) was morphologically differentiated and identified.

2.5 Laboratory works

2.5.1 Faecal sample collection

Faecal sample for parasitological examination was collected from rectum of each animal and faecal samples collected for routine examination should be as fresh as possible using sterile disposable plastic glove. The sample were placed in a labelled clean plastic container (universal bottle) and were transported to the parasitological laboratory of Haramaya University on the same day of collection and were preserved at refrigerator until processing within 48 hours of arrival. During every sampling of study animal information on sex, breed, and approximate age of individual animals, body condition and date of collection were recorded.

2.5.2 Faecal examination

For microscopic examination of the faecal samples, a direct smearing technique and indirect types, such as floatation technique and sedimentation technique are used for identification of different gastro intestinal parasite of small ruminant's eggs and by the use of slides prepared to examine under binocular microscope (x10) objective lens on the bases of morphological appearance, size of eggs and shapes.

2.5.3 Faecal cultures

Faecal samples from animals of the different species and herd whenever positive for nematode eggs was pooled and cultured for harvesting third stage larvae and identification of the most important genera of non-distinguishable nematode eggs in sheep and goat species. Pellet faecal samples of the sheep and goat were tearing up using needle, and by the use of warm water to stimulate larvae to the bottom of the funnel for collection and identification. During this period the larvae was hatched from the eggs and developed into L3. Finally larvae were recovered using the Baermann technique. From each culture, the third stage larvae (L3) was morphologically differentiated and identified.

Data entry and analysis

All collected data were entered to Micro- Soft Excels sheet version 2007 and analyzed by SPSS version 20. Descriptive statistics was used to determine the prevalence of the parasites and Chi-square test was used to assess the association of the potential risk factors with the prevalence of the parasites. For statistical analysis a confidence level of 95% and P-values less than 5% (P<0.05) was considered as significant.

3. RESULTS AND DISCUSSION

3.1. RESULT

Out of the total 383 (216 ovine and 167 caprine) small ruminants examined over the study period, 340 (88.8%) were found to be positive with one or more parasite ova for both species. 383 faecal sample is taken from both species, out of the total of 216 (89.2%) of the ovine and 167 (88.44%) of the caprine studied were found to harbor one or more parasite species.

The prevalence of major GIT helminthes parasite in relation to sex, 87.8% in female and 90.3% in male were observed. Higher prevalence was recorded in female (87.8%) than in male (90.3%) and there was statically significant between sex (χ 2=0.579, and P<0.05; Table 1). The prevalence of major GIT helminthes parasite in different age group were 97.1% in young and 87% in adult sheep and goat and there was statically not significant between age (χ 2=5.707,and P>0.05; Table 2).

Higher prevalence was observed in poor body condition (92.3%) as compared to medium (91.5%) and good (85.6%) body condition. There was also highly statically significant between body condition (χ 2=3.810, and P<0.05 (Table 3).

Table.1. Prevalence of major GITs helmenths based on sex le

Sex	No. examined	No. positive	Prevalence (%)	χ2	P-value
Female	145	131	90.3	0.579	0.447
Male	238	209	87.8		
Total	383	340	88.7		

^{*}P (P<0.05) the difference between sex is statistically significant

< 0.05; = significant

Table.2. Prevalence of major GITs helmenths based on Ages

Age	No. examined	No. positive	Prevalence (%)	χ2	P- value
Young(<2 years)	68	66	97.1	5.707	0.58
Adult (2-3 yaers)	308	268	87		
old (>3 years)	7	6	85.7		
* Total < 0.0TOTOT	383	340	88.72		

P>0.05 the difference between the age is not statistically significant

Table.3. prevalence of GITs helmenths based on body condition

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Body condition	No. examined	No. positive	Prevalence (%)	χ2	P-value
Poor	69	62	89.9	39.734	0.000
Medium	180	108	60		
Good	134	59	44		
Total	383	229	59.79		
*P < 0.05; = significant					

Statically significant (P<0.05) between body condition

Table.4.Prevalence GITs helmenths based on species ontttt

Species	No.examined	No.positive	Prevalence (%)	χ2	P-value
ovine	216	191	89.2	0.06	0.807
caprine	167	149	88.4		
Total	383	340	88.7		
*P < 0.05; = significant					

Table.5. Prevalence of GITs helmenths based on species of animal and parasite d parasite

Species	No.positive	Strongyle (%)	Fasciola (%)	Paramphistomum (%)	Monesia (%)
Sheep	216	95(43.98)	81(37.5)	25 (11.57)	15(6.94)
Goat	167	87(52.09)	36(21.55)	33(19.76)	10(5.98)
Total	383	187(48.82)	117(30.54)	58(15.14)	25(6.52)
*P < 0.05; =					
significant					

(P<0.05) Statistically significant

3.2. DISCUSSION

The present study revealed that the overall prevalence of GIT helminth parasites was 88.3% in the small ruminants examined. This finding is comparable with the finding of (Tesfaheywet, 2012) reported 61.4%, in Haremaya, South Eastern Ethiopia and lowered than the results of other studies in sheep and goat carried out in different part of Ethiopia (Bersissa et al., 2011) 70.2% in Central Oremia, (Nuraddis et al., 2014) 87.2% around Jimma town, Western Ethiopia, (Bikila et al., 2013) 87.3% in Gechi District, Southwest Ethiopia and elsewhere in the world (Pant et al., 2009) 96.0% in Tarai region of Uttarakhand, and (Kuchai et al., 2011) 69.7% in Ladakh, India.

The current higher prevalence finding might be due to now a day the animal owner not manages their animal properly by regular deworming by different anthelmintics during different season of the year, not giving

nutritional feeding of their animal that helps the animal to protect themselves from different helminthes infection by developing rapid immune response to the parasite. Different parasites require different agro climate for multiplication and survival of the infective stage of the parasite and infect the animal and this area might be do not allow this things for the parasite.

The present study showed that 89.2% and 88.4% of sheep and goats respectively are infected with one or more helminthes and higher prevalence was observed in sheep than goats which is agreed with other studies that reported higher prevalence in sheep than goats (Bikila et al., 2013) which is 90.2% and 82.6% in Gechi District, Southwest Ethiopia, (Welemehret et al., 2012) 56.25% and 35.33% in and around Mekelle Town, Northern Ethiopia, (Nuraddis et al., 2014) 89.3% and 87.1% around Jimma town, Western Ethiopia and elsewhere in the world (Mbuh et al., 2008) 96.25% and 86% in Bokova, a rural area of Buea Sub Division, Cameroon, in sheep and goats respectively.

This is higher prevalence in sheep might be due to the grazing habit of sheep when they graze closer to the ground might be consumed the infective stage of the parasite with the grass from the ground where as goats are mostly not grazing close to the ground rather they are brose the leaf of the tree which is above the ground that prevent themselves from exposure to the infective stage of the parasites. Female animals were found with higher prevalence of helminthes infection rate than male animals and there was statically significant (P<0.05) between them in the present study.

The prevalence of GIT helminthes parasite in this study in female and male animal was 87.8% and 90.3% respectively. This finding not agreed with other studies which are reported higher prevalence in female than male (Tesfaheyw et al., 2012) 62.53% and 60.41% in Haremaya, South Eastern Ethiopia, and (Shimelis et al., 2011) 48.80% and 42.42% in North Gondar zone, Northwest Ethiopia in female and male animal respectively. The higher prevalence in males animals observed in the study due to female animals are transported early and more samples were collected from the male, and male animals are kept indoor for the purpose of fattening where as female animals are not manage just like a male animal which are kept on communal grazing on the field.

Higher prevalence was observed in young animal than adult animal in this study and eventhough there was statically not significant (P>0.05) between age group. The prevalence of GIT helminthes parasite in this study young and adult animal was 97.1% and 87%, respectively.

This study is similar to other finding that reported higher prevalence in young animal than adult animal such as (Welemehret et al., 2012) 56.25% and 35.33%, in and Around Mekelle Town, Northern Ethiopia, (Diriba and Birhanu, 2013) 79.6% and 62.4% in and around Asella, South Eastern Ethiopia. This might be due to young animals are susceptible to different diseases including parasitic infection due to low development of immune response to the infection, lack of adaptation and resistance before they exposure to infection whereas adult animals are resistant and adapted to infection due to rapid response of immunity to the infection due to previous exposure of infection which remove the parasite before it attach to its predilection site.

The study showed that higher prevalence of helmintic infection was observed in poor body condition animals as compared to medium and good body condition animals and there was highly statically significant (P<0.05) between body condition. The prevalence of helminthes parasite in these studs in relation to body conditions 89.9%, 59% and 44% in poor, medium and good body condition. This finding is similar to other studies which is (Diriba and Birhanu, 2013) 81.3%, 69.5%, and 61.5% in and around Asella, South Eastern Ethiopia in poor, medium and good body condition respectively. The higher prevalence in poor body conditions might be caused by due to malnutrition, other concurrent diseases or current parasitic infection that lead to lower the immune status of the animal to different diseases or infective stage of the parasites (Welemehret et al., 2012). The major helminthes parasite that has been observed in this study were *Strongyle* type of species (Nematodes), *Fasciola* and *Paramphistomum* species (Trematode) and *Monesia* species (Cestode) parasites of small ruminant in this area. The overall prevalence of this parasite in this animal was 48.82% *Strongyle*, 30.54% *Fasciola*, 15.14% *Paramphistomum* and 6.52% *Monesia* species of helminth parasite in small ruminants. This finding agreed with (Welemehret et al., 2012) in and around Mekelle Town, Northern Ethiopia, and elsewhere in the world (Lone et al., 2012) in Ganderbal, Kashmir. The highest prevalence was seen in *Strongyle* type of parasite than other helminth parasites this might be due to the area is suitable to the survival

of the infective stage of the parasite which means there was optimal moisture and temperature that helps the egg of parasite to hatched and develop the infective stage outside the definitive host. The development of larvae in the environment depends upon warm temperature and adequate moisture. In most tropical and subtropical countries, temperatures are permanently favorable for larval development in the environment.

The survival of larvae in the environment depends upon adequate moisture and shade. Desiccation from lack of rainfall kills eggs and larvae rapidly and is the most lethal of all climatic factors. Larvae may be protected from desiccation for a time by the crust of the fecal pat in which they lie or by migrating into the soil (FAO, 2012).

4. CONCLUSION AND RECOMMENDATIONS

HU farm has large number of small ruminant that are managed under intensive and semi intensive management system in mixed farming system that exported as source of food for different parts of the neighbour country such as dirre dawa, harar and jijiga. The small ruminants was affected by different helminth parasites such as *Strongyle* type, *Fasciola* species, *Paramphistomum* and *Monesia* specie of parasite and sometimes by mixed parasitic infection, Strongyles were the most prevalent parasites encountered in the area followed by *Fasciola*, which causes loss of production, reducing growth rate and death of small ruminants due to lack of proper management like regular deworming, improper feeding, animals are keeping on communal grazing on the field and lack of adequate animal health and production extension workers that give to advise to the animal owner.

Based on the above conclusion the following recommendations are forwarded: Strategic deworming of small ruminants using a broad spectrum anthelmintics should be practiced, the government should be creating awareness to the animal owners to avoid communal grazing and keep their animal indoor to improve the production and productivity of the animal, the animal owner should be restricted their animal to go the field during parasitic season of the year and further studies on epidemiology of GIT helminthes parasite of small ruminants should be conducted on the study area.

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